An integrative review of exercise interventions among community-dwelling adults with Alzheimer's disease

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Alzheimer's disease

- A global epidemic: more than 5.7 million patients; 6.3 cases per 1,000 person-years
- Impact: patients; caregivers
- lack of drugs for AD
- non-pharmacological approaches such as exercise have become more important.

(APA, 2000; Castellania & Perry, 2012; Chan et al., 2013; ; Cummings, Morstorf, & Zhong, 2014; Liu et al., 2017; Alzheimer's Association, 2018)

The effect of exercise on cognitive functions

- The protective effect among order people
  - Mechanisms: cardiovascular and cerebrovascular system; neurotrophic effect; stress and inflammation, insulin sensitivity
- Animal models of AD also showed that exercise was neuroprotective

(Alkadhi & Dao, 2018; Erickson et al., 2011; Kennedy, Hardman, Macpherson, Scholey, & Pipingas, 2017; Koo, Kang, Oh, Yang, & Cho, 2017; Zhang et al., 2018;)

The effect of exercise on cognitive functions

- Yet it is unknown among people with AD
  - The heterogeneity of study design (i.e., mixed type of dementia, types, frequency, duration, and intensity of exercise, comparator groups, the use of multicomponent interventions, and outcome measurements)
  - Bias in program implementation

(Forbes, Forbes, Blake, Thiessen, & Forbes, 2015; Frederiksen, Gjerum, Waldemar, & Hasselbalch, 2018; Gill Livingston et al., 2017; Guitar, Connelly, Nagamatsu, Orange, & Muir-Hunter, 2018 Livingston et al., 2017)

Community

- Over 80% of people with AD live in communities
- Home is the best place to care for persons with dementia

(Alzheimer's Association, 2018; Alzheimer's Disease International, 2017; Bokberg, Ahlstrom, & Karlsson, 2017)

AIM

- Synthesize exercise interventions among community-dwelling adults with AD on health-related outcomes and to provide direction to develop and/or implement appropriate exercise programs to benefit patients and their families

METHODS

Whittemore and Knafl's integrative review framework

– problem identification, literature search, data evaluation, analysis, and presentation

- January 2018 and March 2018; CINAHL, PubMed, Cochrane, EMBASE, and Web of Science
- Inclusion criteria: 1) diagnosis of AD; 2) living in the community; 3) intervention studies; 4) interventions including but not limited to physical activity or exercise; 5) sample size larger than 10; 6) published in English.
- Exclusion criteria: poor quality

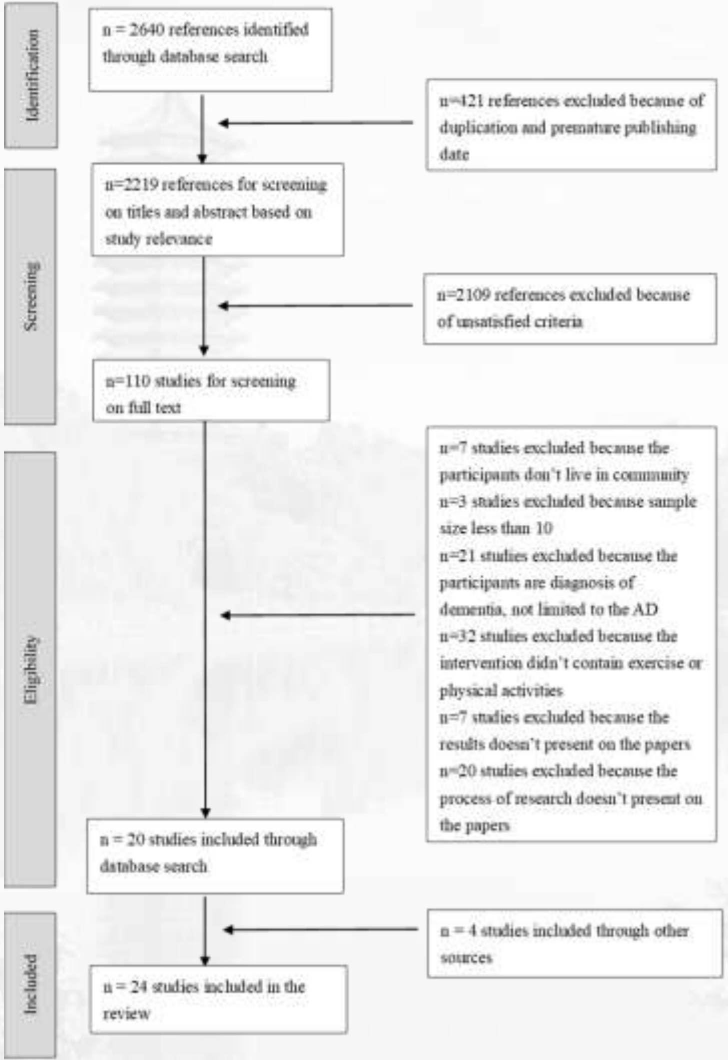
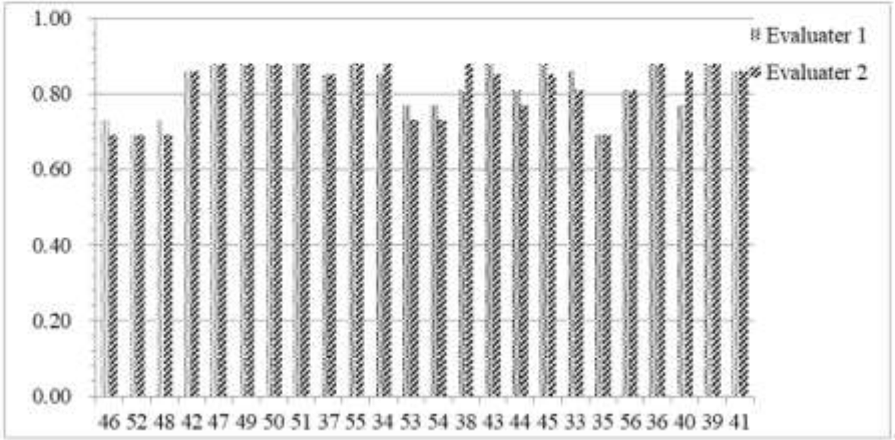


Figure 2 the result of quality assessment



author (year)	location	study design	sample			intervention		length of intervention
			N	age	disease staging	form	FITT	
Garuffi (2013)[44]; Vital et al. (2014)[22]	Brazil	quasi-experiment	34 37	70–86	mild to moderate	G	resistance training, three times per week for 60 min	4 months
Holthoff et al. (2015)[46]	Germany	RCT	30	72.4±4.3 70.7±5.4	mild to moderate	I	lower resistance training three times per week for 30 min on nonconsecutive days	3 months
Yu et al. (2015)[42]	USA	repeated-measures design	26	78±8	moderate mild to moderate	G	aerobic exercise, 3 times a week, 35 to 65 min a session, moderate intensity	6 months
Hoffmann et al. (2016)[47], Sobol et al. (2016)[48], Sogaard et al. (2017)[28], Van der Kleij et al. (2018)[25]	Denmark	RCT	200	70.5±7.4	mild	G	resistance training, aerobic exercise, three times per week for 60 min, moderate to high intensity	4 months
Padala et al. (2017)[37]	USA	RCT	30	73.0±6.2	mild	I	Wii-Fit program: yoga, resistance training, aerobics, balance games, and complex exercise tasks, five days per week for 30 min	2 months
Suttanon et al. (2012)[23]	Australia	RCT	40	81.9±5.7	mild to	I	tailored balance, resistance training and walking	6 months

RESULTS & CONCLUSION

Characteristics of participants

- 24 papers with 17 studies
- 1068 participants
- Generally older than 60 years' old
- Fifteen studies had a male participation rate of 50% or higher

RESULTS & CONCLUSION

Outcomes

- 13 studies mentioned general health, which all appeared beneficial to different aspects, including health-related physical fitness, sleep quality, and metabolic variables.
- 9 studies reported the effects on cognitive ability and 2 studies showed the positive effects.

RESULTS & CONCLUSION

Outcomes

- Exercise is proved to be effective in physical fitness, but the effect of exercise on cognitive function couldn't be determined
- It was consistent with the findings of other systematic reviews *(Littbrand et al.,2011; Forbes et al.,2015; Chen et al., 2018).*

RESULTS & CONCLUSION

The baseline condition of participants

- Severity of dementia, and comorbidities
- Lack of formal questionnaires to obtain comorbidities and exercise levels at baseline

The sensitivity of measurement tools

- MMSE: 8/9 studies
- Objective measurements (e.g., MRI): 1 study

RESULTS & CONCLUSION

Intervention components

– Variety in the type, frequency, time, and intensity of exercise and length of intervention

- around 150 minutes per week *(World Health Organization, 2018)*
- multiple exercise types
- lack of professional and accurate indexes to monitor the intensity of exercise, such as weight load, heart rate, talk test or BRPE.

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RESULTS & CONCLUSION

Processes of implementation

- Adherence: initiative for participation, attendance or delivery fidelity
- Treatment fidelity: keep consistency between implementation and plan by taking systematic and comprehensive approaches in aspects of study design, interventionist training, treatment delivery, treatment receipt, and treatment enactment

SUMMARY

- Exercise is a promising therapy to ameliorate the cognitive ability among people with AD living in the community;
- sensitive outcome measurements combined with objective indictors, as well as the professional and accurate methods monitoring the intensity of exercise should be used in the future;
- treatment fidelity is essential to minimize the interference of confounding factors coming from researchers, intervenors and patients.

Thank you!